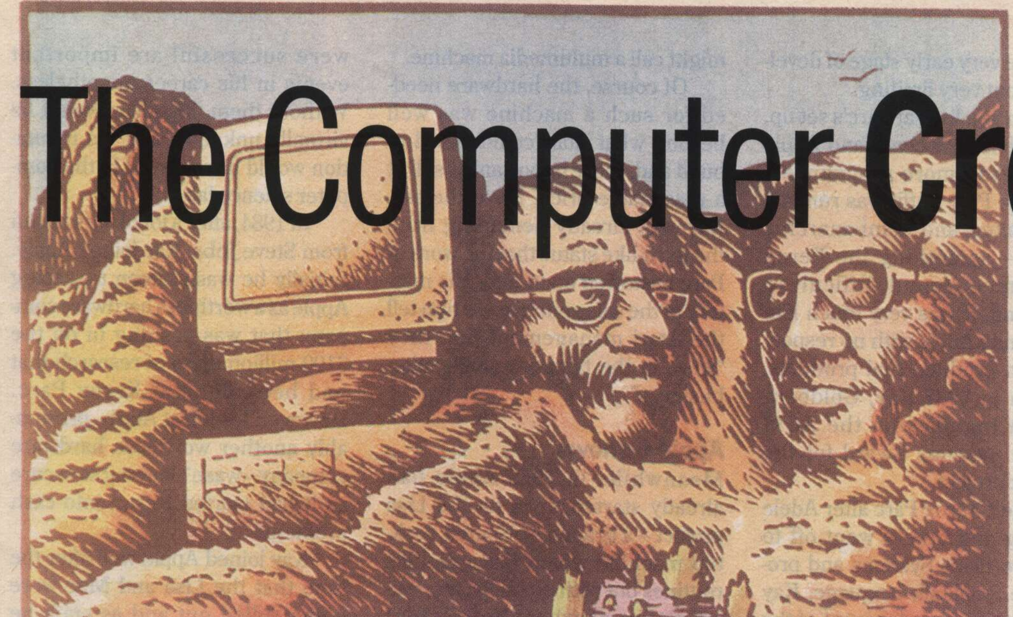
The Computer Creators

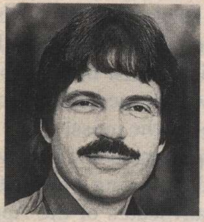


Mike James

introduces Alan Kay, the theorist who got a second bite of the Apple

The personal computer world has more than its share of visionaries. It seems that if you know something about technology, no matter how little, you have a licence to speculate. And while most guesses are proved wildly wrong in the short term and even more wildly wrong in the long term, the fact that computers are getting cheaper and more powerful does give them a second chance. Pundits often get a sense of dejà vu when what was once a rare technique found only in well-funded research labs eventually finds itself 'rediscovered' as a mass market product. This makes the recent history of computing difficult to sort out because everything has been 'invented' at least twice. The designers will claim to be the true inventors of something because they have made it practical, while the pure researchers protest "we did that back in 19xx". Fortunately, that's not always the case. One of those pure researchers, Alan Kay, has had the privilege of seeing a more direct connection between his ideas and marketable products.

File card: Alan Kay



Name: Alan Kay
Born: 1941
Country: USA (born Australia)
Specialism: Interfaces
Theories: Dynabook
Products: Dynabook
Companies: None

Alan Kay is a theoretical computer scientist with a difference. Instead of having theories about how computing hardware or software might be implemented – what you might call the 'inside' view – he thought about how the machine should be used – the 'outside' view.

Born in Australia, Kay grew up in Massachusetts and New York. His mother was a musician and his father a scientist, which gave him a cross-cultural view that probably influenced his choice of academic study: the interesting combination of mathematics and molecular biology at the university of Colorado. Kay learned to program in the Air Force and went on to do a PhD in computing at the University of Utah. At the time Utah was an important centre for graphics research, with Ivan Sutherland's Sketch Pad system being the best-known example. Indeed, many of the ideas we take for granted can be traced back to the research of Sutherland and his contemporaries.

While at Utah, Kay created Flex, a desktop personal computer. But while it had graphics and multiple windows, the user interface was so awful it repelled its users rather than attracting them. Kay then started to read some pop psychology and philosophy, and after Marshall McLuhan told him that the medium was the message, Kay began to consider the computer as part of the creative communications process. He went on to look at the work of Seymour Papert. Based on the ideas of Piaget, Papert had developed Logo, a programming language for children, the core of the idea being the now well-known turtle. Less well-known, however, was Logo's persistent environment that introduced vague notions of objects. Kay also read Piaget and later the cognitivist psychologist Jerome Bruner. At the time all these ideas were part of the popular academic culture of the west coast, like Zen and LSD. Kay's studies convinced him that a good computer interface should be easy enough for children to use.

He spent a short time at the Stanford AI research group before moving to the newly-formed Xerox Parc (Palo Alto Research Center) in 1970. Xerox, the copier company, was very worried about the prospect of the paperless office, so it had set up a research group to put it at the forefront of the computer revolution. The group's research was a success, but it never had the impact it deserved because the Xerox management failed to understand any of its findings.

The boss at Parc was Bob Taylor, who had previously been a projects manager at ARPA (the Pentagon's advanced research projects agency). Although these days Parc gets most of the credit, much of what it did was based on work first done by Doug Engelbart and paid for by ARPA. Engelbart invented the mouse and the interactive style of working in the late 50s. Kay saw a demo of Engelbart's work in 1968 and it was an inspiration to him. "We thought of Doug as Moses opening the Red Sea. You know he was like a biblical prophet… they were actually doing the kinds of things that people still dream of today…" Today, however, Engelbart is almost one of the forgotten prophets.

Central Parc

Kay formed the Learning Resource Group at Parc and set about building his interim Dynabook – the name he coined for his portable computer with everything. There were a lot of very good computer scientists at Parc and Kay found himself surrounded by them, which makes it difficult to sort out exactly what Kay did and how much he simply inspired others to try to meet his goals. Certainly, in each area that Kay was involved there are other able computer scientists whose names cannot be left out. In the invention of the Smalltalk language and system, for instance, Adele Goldberg figures large. In the creation of the hardware – the Alto – Charles Thacker and others take the credit. Even the design of the Alto's software was carried out by Butler Lampson and others. Kay's contribution was to take Smalltalk to the classroom and see how it worked with children – the 'Smalltalk kids'.

However, the key idea was the Dynabook and the quality of its interface. In this respect Kay was playing the same role that Steve Jobs did at Apple. He even mocked up a Dynabook, complete with clay weights, to see what it would feel like; an attention to cosmetic detail very similar to Jobs' concern over the appearance of the Apple II and the Mac.

From today's perspective, the overall Dynabook concept looks misguided. For example, one of Kay's principles was that whatever the Dynabook did, it should always improve on the equivalent process involving paper. But while a machine that behaves like intelligent paper is a good interim product – it gives you drawing and painting programs and the spreadsheet (which surprisingly Parc did not invent!) – it isn't exactly futuristic. It's a bit like saying that all modes of transport should be like walking – true at the very early stage of development, but very limiting.

When you look at Parc's set-up, the parallels between it and Apple become even more pronounced. The whole Parc outfit was run in a very relaxed and semi-anarchic manner – something the Xerox management found difficult to understand. It was very much like an academic Apple with no responsibility to produce real products, although in 1987 Kay, Goldberg and Dan Ingalls won the ACM Software Systems Award for the Smalltalk project.

Kay left Xerox Parc after Adele Goldberg and others went off to form Parc Place Systems and promote the Smalltalk language. Kay saw this as an abandonment of the search for the holy grail – the Dynabook – and while they went off down what he considered an unimportant side road, he resolved to carry on searching for the important things in life. He moved to Atari where he worked on 'fantasy amplifiers' – his catchy term for what we might call a multimedia machine.

Of course, the hardware needed for such a machine was well beyond what Atari could afford to build and, more importantly, sell at a reasonable price. Nevertheless, Kay was already benefiting from the guru-like status that the work at Parc bestowed upon him. His mastery of the sales pitch made him tell the Atari management that they "were in the fantasy amplification business".

Apple turnover

Meanwhile, in 1979 Apple had already started work on the Lisa project – a graphics-oriented desktop machine which had graphics routines but with no really integrated vision of what the product should be. Having heard about the work going on at Xerox Parc from Jeff Raskin, who was working on the Stanford AI project, Steve Jobs offered Xerox the opportunity to invest in Apple if it gave him access to the bag of goodies that Parc was imagined to be. Xerox took 100,000 shares at $10 apiece, promised not to buy more than 5 percent of the company and invited Jobs to come and see Parc.

Larry Tessler, who created the Smalltalk programming environment with Adele Goldberg, showed off the Alto and its iconic interface to a small group from Apple. The Parc people weren't looking forward to the demo, imagining that the Apple people would be drop-out uneducated hackers who knew nothing about computer science. As it turned out, they were impressed by the quality of the questions that were asked. Steve Jobs was overcome, wandering about the room shouting "Why aren't you doing anything with this? This is revolutionary!" By the end of the demo, Tessler had decided to leave Parc and work for Apple.

The story of how the Lisa and the Mac were built is one that doesn't directly involve Alan Kay, but the fact that they were built and, in the case of the Mac, were successful are important events in his career nonetheless. Without them, his ideas would be virtually unknown and his reputation would have stayed in the computer science lab.

In 1984, after a lot of persuasion from Steve Jobs, Kay joined Apple. Initially he wasn't keen to, seeing Apple as a worthless hardware company that was cashing in on the $100 million or so of research that had been done at Xerox Parc. However, his job at Atari – presumably another worthless hardware company – wasn't looking so secure as it had started to run into cash problems.

Kay joined Apple well after the time that the Lisa and Mac were being rolled out and as such he made no contribution to them. He seems to have spent most of his time wandering around telling everyone "We did that at Xerox back in 76" – not an attitude that endeared him to the Apple team.

Indeed, the Parc brand of academic arrogance caused him to write a memo criticising the Mac which even alienated Steve Jobs: "Have I got a deal for you: a Honda with a one-quart gas tank". Kay obviously thought the hardware was so under-powered it couldn't be used for real tasks, and he wasn't the only ex-Parc person to be so affected. When ex-Parc employees applied for a job at Apple, they often left in disgust when they discovered that the Mac didn't even have 2Mb of Ram. Kay was immediately forbidden to speak to the press!

As things turned out, however, Kay ended up being one of the strongest advocates of the Apple way of doing things. In 1987 he and Steve Wozniak made a round-the-world publicity trip and spoke to Apple enthusiasts in an effort to put the ailing company back on its feet. His way with words seems to have impressed everyone who worked with him, since he had the ability to verbalise what was required so that others could work out how to achieve it.

Alan Kay is still with Apple as a research fellow, and his current interests suggest that his thinking has undergone a paradigm shift. He is now interested in the 'agent' approach to computing. The basic idea of an agent is good – an object you can give a task to – but difficult to implement well. His early experiments in this field have been with tanks of simulated fish and, you guessed it, schoolchildren. The child-centred approach to computing clearly hasn't changed! ■

While everyone else was trying to figure out how to build computers, Alan Kay was playing around with kids. These days everyone's trying to figure out Alan Kay, while their kids play around with computers